

To: Peggy Churchill, USEPA

From: Dan Wall, USFWS

Re: Silver Maple Claims Removal Site Inspection, Draft

Dear Ms. Churchill,

I have reviewed the Silver Maple Claims Removal Site Inspection and am providing the following comments.

## GENERAL COMMENTS

### Removal Site Inspection

The Removal Site Inspection (RSI) is intended to determine whether a removal action is warranted in the Silver Maple Claims. It is understood that the evidence for this determination that is presented in the RSI and the streamlined risk assessment are not intended to be comprehensive in scope nor definitive in depth. Relying on a RSI level assessment of risk however, necessitates that the small amount of data collected be interpreted without bias and preferably conservatively to ensure protection of human health and the environment.

Choices made during the design of this field investigation have unfortunately limited the utility of the data. How samples were collected and analyzed, when samples were collected, how many samples were collected, the lack of a reference area for comparison and/or no demonstrated dose dependent responses are examples which are highlighted in detail below.

While the ultimate conclusion of the RSI (removal of exposed tailings) may be a reasonable *minimum* action, the document gives the reader the sense that this recommended action was predetermined. For many reasons, the recommended action is not sufficient to ensure protection of human health and the environment. The recommended action relies on the continued saturation of the tailings which keep the tailings reduced and thereby reduces the mobility of the metals. Beaver activity is largely responsible for ponding of water and inundation of tailings in SMC. A major unanswered question is how this removal action will insure that the saturated tailings will remain saturated if the ponding is dependent on beaver dams?

saturated  
tailings,  
beaver ponds

Additionally, even with removal of exposed tailings, many exposure pathways are unaffected and will still have high prediction of risk (e.g. waterfowl, herbivores, benthic macroinvertebrates). The proposed action will not mitigate risk to these receptors.

The exact methodology and timing of the field investigation was difficult to decipher as I read the RSI. If there was a misunderstanding of the logistics of the investigation, some of the following comments may have to be revised or removed.

## Silver Maple Wetland Functional Assessment

The qualitative assessment of the SM wetland functionality is an interesting piece of information for assessing gross functionality of the wetland. I don't believe this type of assessment is intended, nor able, to determine the effects of chemical contamination on most wildlife receptors but should be weighed with other evidence by risk managers when removal actions are considered. Please see Comment #1 below for more detail.

### SPECIFIC COMMENTS

#### Removal Site Inspection

##### 1) Page 6 of 53, 2nd paragraph, 3rd sentence

The executive summary states that the 7.5 acre wetland is "biologically functional". I do not think that there is sufficient macroinvertebrate, bacterial, fish, avian or small mammal data presented to make this claim and the limited data that is available contradicts the claim. Based on the macroinvertebrate sample, the aquatic invertebrate assemblage is characterized in the report as "impaired" or "absent" (page 33). It should be noted that no sediment dwelling organisms were sampled. Additionally, dissolved concentrations of Zn in SMC (regardless of source) exceed acute aquatic life criteria 2-5 fold according to BLM and USGS (2003, table 8) data. The dose response curve for Zn is very steep for some species and it is likely that the aquatic community is impaired or absent as a result of the Zn concentrations in the water. Vegetation is present in the wetland but the results of the investigation reveal high levels of lead, cadmium, arsenic and zinc in the tissues of some plant species. These data do not support the conclusion that the wetland is biologically functional.

Presumably, the statement that the wetland is biologically functional is meant to reflect the high wetland functionality score in the wetland assessment. If so, I think this is a mis-application of the results of the HGM. The HGM for Summit County is described in Appendix 8 and is based on the classification system developed by the Army Corps of Engineers (Brinson, 1993). According to Appendix 8, the Summit County HGM "rates whether a wetland has the opportunity or ability to perform a particular function...or is unlikely to perform that function." As I understand the method, this does not mean for instance, that if the wetland scores a "high" rating for microtopography, that bacterial communities are present and/or functional. Rather, that the physical and morphological features are present to allow for microbial activity. As described in Brinson, 1993, the method "relies almost exclusively on the geomorphic, physical and chemical descriptors." and is intended to "lay a foundation for ongoing efforts to develop methods for assessing the physical, chemical and biological functions of the wetlands." I think the wetland functionality assessment can serve to underscore the potential for a highly functional wetland based on physical features, but is not intended to measure whether a wetland is biologically functional.

HGM

Please revise this statement in the executive summary and elsewhere to more accurately reflect the conclusions of your R&I and the intent of the HGM wetland classification.

**2) Page 12 of 53, section 2.2, bullet 4**

How was this conclusion reached and has it been ground truthed? Figure 4 is illegible.

**3) Page 13 of 53, section 2.3, 1st paragraph**

Comment [DW1]: Are we sure Peggy?

I believe that EPA has rescinded the NFRAP designation in the last 2-3 years. For completeness, this should be included in the description of previous investigations and actions for the site.

**4) Page 14 of 53, section 3.1, Data Quality Objectives**

It is stated that the DQOs are designed to ensure that the type, quantity and quality of environmental data are appropriate for the intended purpose. Additionally, the DQOs clarify the study objective, define the most appropriate type of data to collect, establish the most appropriate conditions from which to collect data and specify tolerable limits on decision errors.

Section 3.1 provides a list of study objectives that this investigation is intended to achieve as well a generic description of what types of decisions these objectives are intended to support. The section also lists several standard operating procedures for analytical procedures which presumably have general instrument performance criteria. The section appears to be completely lacking however, in a justification of why the particular analytical procedures were selected, what number of biotic and abiotic samples are needed, what types of biotic samples are needed, what sampling procedures are most appropriate, where the samples will be taken, when the samples will be taken, how the data will be interpreted without comparison to a reference site etc. I think the investigation would have benefited if these questions were openly addressed before the sampling occurred. Presumably, there was a sampling plan which has more detail about the DQOs, but to my knowledge, this was not been shared with the Silver Creek Stakeholder Group.

**5) Page 15 of 53, 1st full paragraph**

Please provide a table with the detection limits of all metals that were analyzed for using XRF. For the purposes of determining risk, detection limits of "25-50 mg/kg" exceed many metal/receptor risk management criteria which greatly limit the utility of the results.

**6) Page 15 of 53, fourth full paragraph**

EPA Method 1312 (SPLP) –

Please specify the make-up and pH of extraction fluid(s) used in the SPLP?

**7) Page 16 of 53, 1st paragraph, last sentence**

The sentence states that Dynamac measured the biological functioning of the wetland. I did not find the phrase "biologically functional" in the Dynamac report conclusions. Please see comment 1.

**8) Section 3.5 Page 16-17 of 53**

This is a very confusing paragraph. The text says, starting with the 4th sentence, "Macroinvertebrates samples were collected by BLM and personnel from Utah State University at the SMC site to determine the abundance and diversity of macroinvertebrates and to help determine the health of Silver Creek in this reach. In addition, one composite sample each was collected in December 2002 of macroinvertebrates and fish .....for...metals analysis.." This sounds like there were several samples collected for community structure analysis. As I understand the text there was only a single sample collected of water column invertebrates associated with submerged vegetation. Please clarify. I don't believe determining the abundance and diversity of macroinvertebrates can be accomplished with sufficient confidence using the reported sampling methodology. The invertebrate sample for metals analysis was collected in December 2002 and the community structure sample (or samples) was collected when? If they were collected at different times, why?

**9) Section 3.8, Page 17 of 53 and attachment 2**

More thorough presentation of XRF confirmation samples needs to be presented. All metals analyzed by XRF, that are presented and discussed elsewhere in the text need to have confirmation data (analytical results and statistics) presented. At a minimum, this includes Se, Hg, Cd, Cr, Cu, Ni, Fe and Mn. Arsenic XRF values are not usable according to the data in the table.

**10) Section 4.1**

The sampling design appears to be a series of transects across silver creek but is referred to as a grid in several places. Please clarify this.

**11) Section 4.1.1, second paragraph.**

This paragraph is confusing and the first sentence is possibly a typo. I don't understand which data was omitted or why. *All* of the data should be presented so it can be evaluated. Please clarify.

Please provide the information that is used to support the conclusions concerning the chemical signature of tailings. Graphical and spatial representations would be helpful.

#### **12) Section 4.1.1**

The date which the surface and depth samples were collected is confusing, both here and in section 3.2. Section 3.3 indicates that that depth profile samples were collected in December 2002 and section 4.1.1 (paragraph 3) suggests that surface samples were collected in July 2002. Is this correct? If this is correct, and due to the very small number of laboratory analyzed confirmation samples, wouldn't confirmation samples be needed for both sampling events to ensure the proper operation of the XRF? If 2 sets of confirmation samples were collected, please provide this data.

#### **13) Section 4.1.2**

I think that the saturated (reduced) versus unsaturated (oxidized) tailings experiment is interesting and the results are well supported in the literature. I would however, like a more balanced presentation of the implications of the reduced leachability of the metals in reduced sediments. There are several points that are not addressed in this section that deserve to be mentioned to avoid giving the wrong impression to some readers. Paragraph 3 mentions that the fraction of cadmium that is leachable via the SPLP is 0.00004. This concentration however, still exceeds water quality standards by an order of magnitude (Pb concentrations also exceed criteria). This means that benthic macroinvertebrates that inhabit the hyporheic zone and interstitial pores of shallow sediments will likely be impaired even under reduced conditions. Also, high and very high levels of Hg were reported for the oxidized and reduced tailings and sediment samples. Bioaccumulative chemicals such as Hg should be explicitly excluded from this discussion since their environmental fate is much more complicated than Cu, Cd, Pb, and Zn. Including Hg in Table 4 without discussing (as in section 4.5) that the same conditions which promote immobilization of most metals of concern, promote the conversion of Hg to the more toxic methylated form, may be misleading to some readers.

#### **14) Page 22 of 53, Section 4.3.1, 2nd paragraph**

See comment 1. "biological functioning"

#### **15) Page 24 of 53, Section 4.3.2, Last paragraph**

This paragraph contains numerous errors concerning mercury in fish tissue.

A) Sentence 3- "EPA has recently published a new ambient water quality criterion for methylmercury for the protection of aquatic life"

The document cited at the end of this paragraph (EPA 2000b) and the source of the 0.3 mg/kg MeHg fish tissue criteria is for protection of humans who consume fish, not aquatic life.

Sentence 4- "The criterion is 0.3 mg/kg mercury in fish tissue instead of water concentration."

The criterion is for methylmercury in edible portions of fish. Mercury water quality criteria have not been replaced for protection of aquatic life.

C) Sentence 5- "Comparing this criterion to the fish and macroinvertebrate mercury concentrations indicates mercury is not significantly bioaccumulating in the aquatic food chain."

Comparing the concentration of MeHg in whole-body fish tissues of inedible (for humans) fish collected in December (one composite sample) to the human health fish tissue (edible portions) consumption criteria to make a conclusion about the significance of Hg bioaccumulation into the aquatic food chain is not defensible. The fish species are not comparable, the fish tissue (whole body vs filet) is not comparable, the season the fish were collected will likely bias the results downward (see comment 18 below) and there was only a single composite sample collected. Additionally, no mention is made that MeHg in water from the "SMC center" sample is 3.5x the water based criteria for fish eating wildlife as listed in table 7. Please significantly revise or remove this section.

#### **16) Section 4.4 –Macroinvertebrate Characterization**

When and how the sampling was done, is a bit confusing. I think the document would benefit if this were spelled out more clearly in the methods section. Two composite samples were collected about 6 months apart. One sample was for metals analysis (December) and one was for community structure analysis (July). ?

The introduction of section 4.4 states that "the purpose of the work was to 1) provide an initial assessment of the aquatic macroinvertebrate assemblage and compare our findings to samples previously collected by the USGS (2001) and 2) provide guidance on future sampling to evaluate changes to aquatic macroinvertebrate assemblages as reclamation work is conducted in the future."

The USGS 2001 data was collected according to NAWQA protocol in which the stated "objective of the sampling was to obtain as complete a list of invertebrate taxa in a sampling reach as possible by sampling multiple habitat types (USGS 2001)." As I understand the macroinvertebrate characterization methodology used by BLM, a dipnet was used to collect invertebrates associated with the aquatic plant *Potamogeton* - a submerged, rooted plant that occupies the water column. This sampling approach will likely be strongly biased towards water column invertebrates. With such different sampling techniques, how will the invertebrates collected from a single specific habitat be compared to the USGS 2001 data as stated in objective 1? In my opinion, such a major difference in methodology precludes even qualitative comparisons.

#### **17) Section 4.4.2,**

This section begins by stating that the invertebrates were "very abundant" at the beaver pond. Isn't it difficult to make this statement in the results section without comparison to a reference area or some other objective point of reference?

The first paragraph of the results section states that the data suggest this site is moderately impaired compared to unimpacted sites. The evidence is based on prior sampling in the region by Utah State University with emphasis placed on taxa richness and a lack of metals sensitive organisms. Does this comparison take into account that BLM personnel collected one sample of invertebrates associated only with submergent vegetation? I don't believe that you would expect to find significant numbers of species of caddisflies, stoneflies or mayflies when sampling in and on *Potamogeton*.

The second paragraph in Section 4.4.2 states that the invertebrate assemblage is impaired due to metals from upstream tailings areas. I have not seen the evidence for this definitive conclusion. Please explain.

#### **18) Section 4.5**

It is unclear why water, sediment, macroinvertebrates and fish samples collected for mercury analysis were collected in December. During colder months, biological activity (micro and macro) is decreased and oxygen solubility is increased. These conditions are likely to bias the results towards the lowest seasonal levels of methylated mercury in water, sediments and fish. Authors cited in the RSI for their work with *Potamogeton* and mercury contaminated mesocosms (King et al., 2001) discuss the effects of season on MeHg production at some length in their paper and it is also reported in Shanley et al., (2005). This sampling bias should be added to the text for clarification. USGS mercury samples from Silver Creek were collected in July meaning methylmercury levels may be at their highest seasonal level and thus preclude any meaningful comparison to data in the RSI.

Were the sediment samples whole sediments? USGS (2001) wet sieved their sediment samples to 63 um before analysis. By analyzing only the small sized particles, USGS very likely enriched the amount of Hg and MeHg that they detected in their samples. If BLM analyzed whole sediments then the results are not comparable to USGS 2001 because the results from SMC are likely biased low and possibly very low.

The last sentence states that results for total Hg slightly exceed UT water quality standard for Hg. To be consistent, please include that the "SMC center" MeHg results exceed the fish-eating wildlife criteria in table 7.

#### **19) Section 4.7, last paragraph**

In addition to seasonal low water situations, removal of beaver from SMC by natural or other methods might result in a dramatic decrease in the water level and subsequent oxidation of tailings.

**20) Section 5.0, 4th paragraph**

The screening process is a very important step and needs to be transparent. Please provide a table which documents the selection of COPCs for all media.

I believe the reference "EPA, 2000b" should be "EPA, 2000a".

**21) Section 5.5, Page 33 of 53, 1st paragraph**

1st Paragraph-It is stated that the "sediment quality triad of chemistry, toxicity and biology was observed to the degree possible considering the nature and scope of a streamlined risk assessment....". The sediment quality triad, as it is typically applied relies upon 1) a comparison of a selected fraction of metals measured in the sediment to a selected benchmark (chemistry) 2) some type of toxicity bioassay (toxicity) and 3) an assessment of the benthic macroinvertebrate community (biology).

For Chemistry, the RSI proposes to compare whole sediment metals concentrations to PECs benchmarks to satisfy the chemistry section of the triad but it is unclear if detection limits are low enough to make this comparison for some metals (see comment 5) The toxicity component of the triad is not present. For biology, the macroinvertebrates that were sampled from SMC were not associated with sediment (see comment 17), there were no samples collected from a reference area for comparison, and sampling methodologies were inconsistent with other collections on Silver Creek (see comment 16). I think it is an overstatement of the data to claim the sediment quality triad was employed, recognizing it is a streamlined risk assessment, when at least 2 of the 3 legs of the triad are missing or uninterpretable.

**22) Section 5.5, "Macroinvertebrate Assessment"**

Sentence 1 says that the sample location was selected because it is "expected to be highly contaminated because of the high loadings and exposed tailings at the hot spot". Sentence 2 attributes the apparent impairment of the macroinvertebrate community to metals "derived from upstream tailings areas". From my knowledge of the site I think it is a fair assumption that both upstream tailings and SMC tailings contribute significantly to the metal concentrations in the beaver pond.

Additionally, see comments 16, 17 and 21.

**23) Page 34 of 53, 2nd full paragraph**

I do not think that the conclusion stated in this paragraph is supported by the data. Mercury and methylmercury data from USGS (2001) cannot be compared to data from SMC with any confidence for 2 reasons: 1) The samples were collected during different seasons (USGS-July, SMC-December) which will likely bias methylmercury results toward SMC samples appearing lower than the USGS results. 2) The USGS sieved their



samples to <63 um before mercury analysis. This will enrich (probably substantially) the metal content of the sample. Exact sediment sampling protocols are not readily apparent in the document, but no mention is made of sieving is made in the RSI. If sieving was done to the SMC, then comparison of total mercury are possible. (see comment 15)

#### **24) Section 5.5, Sediments**

Conclusions made in the 3rd and 4th sentence are based on biased data and should be removed. See comments 18 and 23.

The last sentence on page 34 states that alkaline pH and dissolved organic matter reduce the bioaccumulation of MeHg. This is a selective and misleading presentation of a very complex and incompletely understood phenomenon. Several conditions are discussed in these documents that would promote both the rates of methylation and bioaccumulation. Organic carbon, reduced sediments and most importantly MeHg concentrations are all variables that are present in SMC that would promote bioaccumulation. Please provide a balanced look at the methylation and bioaccumulation with a discussion of the significant uncertainties associated with the sampling design and sample handling. See comments 18 and 23.

#### **25) Section 5.5, Wildlife**

Sentence 1 - I don't think avian species are necessarily "sensitive receptors". Maybe some are, but I am under the impression the "sensitive" bird species that would be expected at SMC actually have higher exposures rather than greater sensitivity.

#### **26) Section 5.5 last paragraph**

This paragraph appears to overstate the data-as described in numerous comments above-while simultaneously minimizing potential risk to ecological receptors. In light of the comments we have provided, please consider rewriting this paragraph to eliminate the appearance of bias.

#### **27) Section 5.6.1**

There is little question that there are significant upstream sources that need to be addressed to ensure any actions taken in SMC are not recontaminated. If water quality standards can be met by removing upstream sources, how will this remedy ensure protectiveness for receptors which ingest sediment, contaminated flora or live in the interstitial porewater? Please include a discussion of this in your removal actions considerations. Additionally, much of the success of the "less-intrusive removal action" is greatly dependent upon maintaining inundation of the sediments to keep them in a reduced state. How will the maintenance of beaver dams, to insure the tailings remain reduced, be accomplished?

#### **28) Section 5.8**

Despite many significant disagreements with how the data was collected, interpreted and presented, we agree with the recommendation but think the risk is understated. Removal of exposed tailings is a reasonable minimal recommended removal action.

## 29) Section 7.0

The preliminary remedial action objectives rely on a select group of ARARs that support the recommended removal, but ignore other possible requirements. Please consider the following ARARs or at a minimum these Executive Orders should be incorporated into the removal actions objective.

### *Executive Order: 12962 Recreational Fisheries*

Federal agencies shall, to the extent permitted by law and where practicable, and in cooperation with States and Tribes, improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities by:

(b) identifying recreational fishing opportunities that are limited by water quality and habitat degradation and promoting restoration to support viable, healthy, and, where feasible, self-sustaining recreational fisheries;

### *Executive Order 13186: Responsibilities of Federal Agencies To Protect Migratory Birds*

Federal Agencies are directed to...

(2) restore and enhance the habitat of migratory birds, as practicable;  
(3) prevent or abate the pollution or detrimental alteration of the Environment for the benefit of migratory birds, as practicable;

Shanley et al., (2005). Physical Controls on Total and Methylmercury Concentrations in Streams and Lakes of Northeastern USA. *Ecotoxicology*, 14, pp. 125-134, 2005.